

Claims

- [c1] 1. An imaging apparatus for producing Magnetic Resonance (MR) images of a subject, the apparatus comprising:
a magnet assembly for producing a static magnetic field;
a gradient coil assembly for generating a magnetic field gradient for use in producing MR images;
at least one radiofrequency (rf) coil array disposed about the subject for transmitting a radiofrequency pulse and for detecting a plurality of magnetic resonance (MR) signals induced from the subject for a given imaging sequence;
a positioning device for supporting the subject and for translating the subject during imaging; and,
a plurality of receivers for receiving the plurality of MR signals, the receivers each being adapted to adjust their respective center frequencies at a rate commensurate with a rate of translation of the positioning device.
- [c2] 2. The apparatus of claim 1 wherein the at least one rf coil array is mounted on a fixture that is disposed about the subject.
- [c3] 3. The apparatus of claim 2 wherein the fixture and rf coil array mounted thereon are stationary relative to the static magnetic field.
- [c4] 4. The apparatus of claim 2 wherein the fixture and rf coil array mounted thereon are moveable relative to the static magnetic field.
- [c5] 5. The apparatus of claim 1 wherein the at least one rf coil array comprises a plurality of coil elements arranged in a orthogonal distribution relative to a frequency encoding direction.
- [c6] 6. The apparatus of claim 1 wherein the at least one rf coil array detects the MR signals concurrently with the translation of the positioning device.
- [c7] 7. The apparatus of claim 1 further comprising:
an image processor for computing a plurality of respective sub-images corresponding to a field-of-view at a plurality of incremented locations of the subject and wherein the image processor is further adapted to combine the plurality of respective sub-images to form a composite image of the subject.

- [c8] 8.The apparatus of claim 1 wherein the imaging sequence is one of multi-slice, multi-slab, and volume imaging sequences.
- [c9] 9.A method for producing an image from an extended volume of interest within a subject using a Magnetic Resonance Imaging (MRI) system where the extended volume of interest is larger than an imaging portion of a magnet within the MRI system, the method comprising:
translating the volume using a positioning device along an axis of the MRI system and imaging portions of the volume when they are within the imaging portion of the magnet;
detecting a plurality of MR signals from at least one radiofrequency (RF) coil array for a given field-of-view within the MRI system as the positioning device is translating the volume;
sending the plurality of MR signals to a plurality of receivers, the receivers each being adapted to adjust their respective center frequencies at a rate commensurate with a rate of translation of the positioning device,
computing a plurality of respective sub-images corresponding to the plurality MR signals for each of the plurality of receivers and for the given field-of-view (FOV) at a plurality of incremented locations of the subject; and,
combining the plurality of respective sub-images to form a composite image of the volume of interest.
- [c10] 10.The method of claim 9 wherein the at least one rf coil array is mounted on a fixture that is disposed about the subject.
- [c11] 11.The method of claim 10 wherein the fixture and rf coil array mounted thereon are stationary relative to the static magnetic field.
- [c12] 12.The method of claim 10 wherein the fixture and rf coil array mounted thereon are moveable relative to the static magnetic field.
- [c13] 13.The method of claim 9 wherein the at least one rf coil array comprises a plurality of coil elements arranged in a orthogonal distribution relative to a frequency encoding direction.
- [c14] 14.The method of claim 9 wherein the detecting step is performed concurrently

with the translating step.

- [c15] 15.The method of claim 9 wherein the translating step is repeated until a selected length of the subject has been imaged inside the imaging portion of the magnet.
- [c16] 16.The method of claim 9 wherein the combining step further comprises combining a central portion of each sub-image to form the composite image.
- [c17] 17.The method of claim 9 wherein the extended volume of interest is a head-to-toe view of the subject.
- [c18] 18.A method for imaging an extended volume of interest within a subject using a Magnetic Resonance Imaging (MRI) system comprising:
translating the subject into an imaging portion of a magnet assembly of the MRI system;
detecting a plurality of MR signals from a radiofrequency (RF) coil array; and,
sending the plurality of MR signals to a plurality of receivers, the receivers each being adapted to adjust their respective center frequencies at a rate commensurate with a rate of translation of the positioning device; and,
reconstructing at least one image of the volume of interest by computing a plurality of respective sub-images corresponding to the plurality MR signals for each of the plurality of receivers and for the given field-of-view (FOV) at a plurality of incremented locations of the subject as the subject is translated and combining the plurality of respective sub-images to form a composite image of the volume of interest.
- [c19] 19.The method of claim 18 wherein the extended volume of interest is a head-to-toe view of the subject.
- [c20] 20.The method of claim 18 wherein the at least one rf coil array comprises a plurality of coil elements arranged in orthogonal distribution to a frequency encoding direction.
- [c21] 21.The method of claim 18 wherein the at least one rf coil array is mounted on a fixture that is disposed about the subject.

- [c22] 22.The method of claim 21 wherein the fixture and rf coil array mounted thereon are stationary relative to the static magnetic field.
- [c23] 23.The method of claim 21 wherein the fixture and rf coil array mounted thereon are moveable relative to the static magnetic field.
- [c24] 24.The method of claim 18 wherein the detecting step is performed concurrently with the translating step.
- [c25] 25.The method of claim 18 wherein the translating step is repeated until a selected length of the subject has been imaged.
- [c26] 26.The method of claim 18 wherein the translating step is substantially continuous.